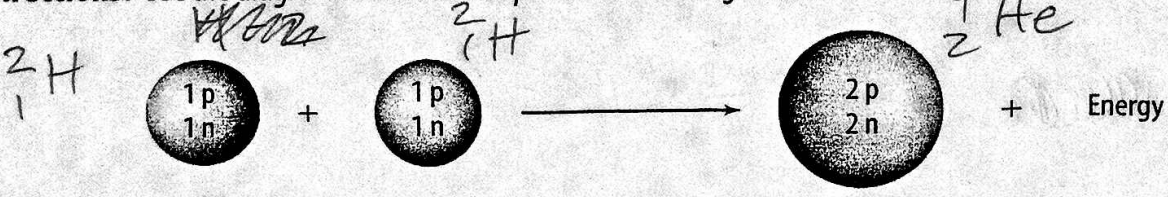
Name Key Date Class

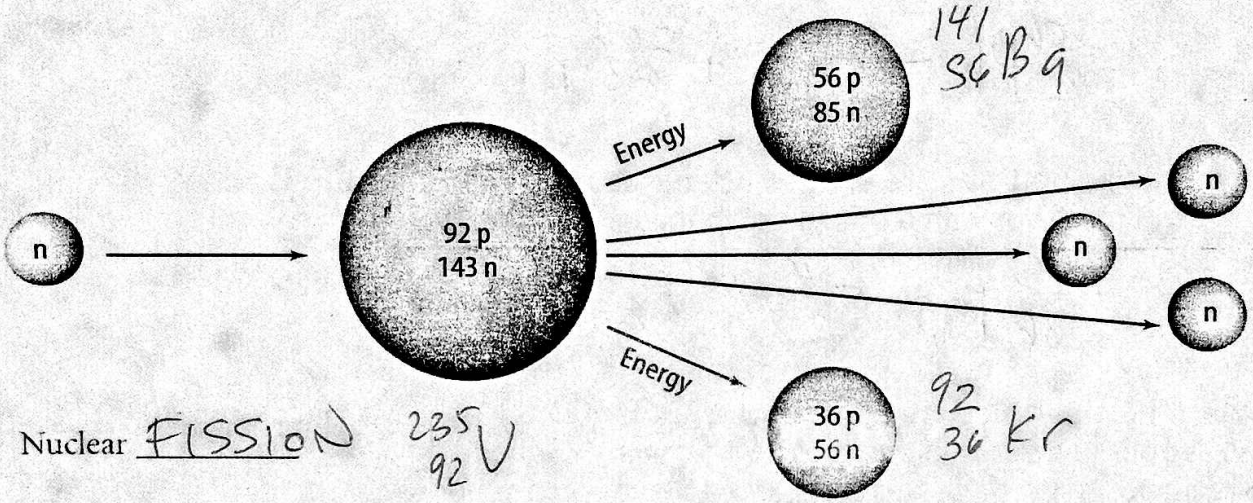
SECTION 4 Reinforcement

Nuclear Reactions

Directions: *Use the diagrams below to complete the following activities.*



Nuclear FUSION



Nuclear FISSION 235 92 U

1. The diagrams show two types of nuclear reactions: nuclear fission and nuclear fusion. Label the type of reaction shown in each diagram in the space provided.
2. Circle the letter of the equation that correctly explains the nuclear reaction shown in the top diagram.

   a. H-2 + H-2 → H-4
   c. H-1 + H-1 → H-2
   b. H-2 + H-2 → He-4
   d. H-1 + H-1 → He-2

3. Circle the letter of the equation that correctly explains the nuclear reaction shown in the bottom diagram.

   a. 1 neutron + U-235 → Ba-141 + Kr-92 + 3 neutrons + energy
   b. 1 neutron + U-238 → Ba-141 + Kr-92 + 4 neutrons
   c. Ba-141 + Kr-92 → U-235 + 3 neutrons
   d. Ba-141 + Kr-92 → U-238

4. What two elements are involved in the nuclear fusion reaction? H $^{3}_{1}$ He
5. Label each atom in the fusion reaction with its correct symbol and isotope notation.
6. What three elements are involved in the fission reaction shown? U, Ba & Kr
7. Label each atom in the nuclear fission reaction with its chemical symbol and its correct isotope notation.

Name KEY Period ____

Nuclear Decay & Half-Life Problems

1 - Show the complete chemical equation for a Radon-222 nucleus that undergoes alpha decay.

$^{222}_{86}Rn \rightarrow {}^{4}_{2}He + {}^{218}_{84}Po$

2 - Show the complete chemical equation for a Lead-206 nucleus that undergoes beta decay.

$^{206}_{82}Pb \rightarrow {}^{0}_{-1}e + {}^{206}_{83}Bi$

3 - How many alpha particles are emitted when Radon-222 decays to Polonium-218? 1

Prove your answer with a complete chemical equation.

$^{222}_{86}Rn \rightarrow {}^{4}_{2}He + {}^{218}_{84}Po$

4 - How many beta particles are emitted when Potassium-40 decays to Calcium-40? 1

Prove your answer with a complete chemical equation.

$^{40}_{19}K \rightarrow {}^{0}_{-1}e + {}^{40}_{20}Ca$

5 - If the half-life of I-131 is 8 days, how much time would be needed to reduce 1g of I-131 to 0.25g?

$\frac{1}{2} \Rightarrow \frac{0.5}{2} = 0.25$

1 2

$8 \times 2 =$ **16 days**

6 - If the half-life of I-131 is 8 days, how much of a 5g sample is left after 40 days?

$8\overline{)40}^{\,5}$

$\frac{5g}{2} = \frac{2.5}{2} = \frac{1.25}{2} = \frac{0.625}{2} = \frac{0.3125}{2} =$ **0.156g**

1 2 3 4 5

7 - If the half-life of C-14 is 5,730 years, how much of an 80g sample is left after 17,190 years?

$5{,}730\overline{)17{,}190}^{\,3}$

$\frac{80}{2} = \frac{40}{2} = \frac{20}{2} =$ **10g** OR $\frac{80}{8} = 10$

1 2 3

8 - If the half-life of C-14 is 5,730 years, how much atime would be needed to reduce 80g of C-14 to 1.25g?

3 H.L. $\frac{10}{2} = \frac{5}{2} = \frac{2.5}{2} = 1.25$

4 5 6

$5730 \times 6 =$ **34,380 yrs**

$\frac{80}{64}$